# SECTION 608
# RIGHT-OF-WAY FENCE

**608.1-DESCRIPTION:**

This work shall consist of the construction of fences and gates of the types designated, in accordance with these Specifications and in reasonably close conformity with the lines, grades, locations, and dimensions shown on the Plans or established by the Engineer.

**608.2-MATERIALS:**

Materials shall meet the requirements specified in the following Subsections of Division 700:

| MATERIAL | SUBSECTION |
|---|---|
| * Chain Link Fence | 712.8 |
| Farm-Field Fence (Woven Wire) | 712.9 |
| Barbed Wire | 712.10 |
| Steel Posts, Post Braces and Gate Frames | 709.46 |
| Pressure Treated Wood Posts and Braces | 710.3, 710.5 |
| Zinc Rich Primer (Galvanized Repair) | 711.21 |
| Aluminum Paint (Aluminum-Coated Repair) | 711.9 |
| Concrete for Footers | 715.12 |

*Chain link fence fabric may be zinc-coated steel or aluminum-coated steel.

Posts for farm-field fence may be of either steel or wood, and the Contractor shall indicate at the pre-construction conference the type of post the Contractor elects to use and that type shall be used throughout the Project.

Gate frames shall be constructed of tubing having the dimensions and weights called for on the Plans. Gate frames may be constructed using pressed steel corner fittings or die-cast aluminum corner fittings, may be provided with heavy malleable iron corner fittings or otherwise shall be of an adequate, sturdy design. Gate frame corner attachments may be of welded construction, if the gate frame receives its coating protection after fabrication of the gate structure is completed. All gate frames shall have truss rods as shown on the Plans.

All gates shall be equipped with approved latches, stops, suitable locking devices, and satisfactory provisions for padlocking. Means shall be provided for securing and supporting the free ends of vehicular gates in the open position. Hinges shall be malleable iron, pivot type, heavy and strong, with large bearing surfaces for clamping onto the posts, or equal. Hinges shall not twist or turn under the action of the gate and shall be so arranged that a closed

gate cannot be lifted off its hinges to obtain entry. Vehicular gates shall be capable of being operated easily by one person and shall be of the full 180 degree open swing type. Pedestrian gates shall be equipped with a positive stop which will not permit the gate to swing toward the highway and shall be provided with a satisfactory spring or other positive means to maintain the gate in a closed position.

The filler fabric for pedestrian gates and vehicular gates shall comply with the requirements for the fencing fabric of the fence in which the gate is to be installed.

Miscellaneous hardware and fittings shall conform to the details shown on the Plans or other alternate designs acceptable to the Engineer.

When the locations of manufacturing plants allow, the plants will be inspected periodically for compliance with specified manufacturing methods, and material samples will be obtained for laboratory testing for compliance with materials quality requirements. This may be the basis for acceptance of manufacturing lots as to quality.

All materials must be protected from damage during storage and handling. All materials, including materials which have been approved previously, will be subject to inspection by the Engineer as to condition at any time prior to or during incorporated of the material in the work. Materials which have been damaged shall not be used.

## CONSTRUCTION METHODS

**608.3-GENERAL:**

The Contractor's activities and operation shall be confined to the area immediately adjacent to the right-of-way fence and within the highway right-of-way. The Contractor shall be responsible for satisfactory arrangements for such permits as required by them from adjacent owners in performing the work.

If the installation of certain portions or lengths of the right-of-way fence is more essential than other portions or lengths, the Engineer may designate the portions or lengths of the fence that are most essential, and the Contractor shall conduct his operations so as to give priority to the erection of such portions or lengths.

When temporary fence is not provided as a separate bid item in the Contract, the Contractor may defer installation of the permanent right-of-way fence by erecting and maintaining adequate temporary fence. The Contractor shall be responsible for prohibiting livestock from entering upon the work area and to contain livestock in the property residues from which it is necessary to remove the existing fence.

**608.4-CLEARING, GRUBBING, AND TRENCH EXCAVATION:**

The Contractor shall perform such clearing and grubbing as may be necessary to construct the fence to the required grade and alignment.

When necessary in areas of irregular ground to secure clearance between the ground line and the bottom of the fence fabric, to obtain the established

grade, or to permit placing steel barbed wire below the bottom of the fence fabric at stream crossings and minor depressions, a trench shall be excavated to the grade and line established or designated. In the areas where rock is encountered, the rock shall be excavated as may be necessary, in the opinion of the Engineer, to the required grade and line. Any excavation of rock below the required grade shall be backfilled with suitable materials as directed. Trenches shall be so constructed as to insure proper drainage and shall be of the cross section shown on the Plans or as directed. In general, the bottom of the fence shall follow the contour of the ground in accordance with usual practice in constructing fence of the type specified, and it is not anticipated that a great amount of shallow trench excavation will be required.

**608.5-CONCRETE FOOTERS:**

Footers, where required, shall be constructed of cast-in-place concrete meeting the requirements of 715.12. Concrete shall be placed promptly and without segregation after mixing.

Concrete footings shall be carried down to at least the depth, and shall be not less than the dimensions, shown on the Plans. The top of all footings shall extend slightly above the ground line and shall be steel troweled to a smooth finish with a slope to drain away from the post. Posts, braces, and other units shall be approximately centered in their footings.

If the ground is firm enough to permit excavation of a hole to neat dimensions, the concrete may be placed without forms by completely filling the hole. In this case, the earth coming in contact with the concrete must be moistened to a depth of at least 2 inches (50 mm) just prior to placing the concrete in the hole. No curing will be required other than the placing of not less than 4 inches (100 mm) on loose moistened earth, free from clods or gravel, over the top of the footing immediately after placing the concrete.

Where the ground cannot be satisfactorily excavated to neat dimensions, forms shall be used for footings. In this case, where the soil is not moist, not less than one gallon (4.0 liters) water shall be placed in the bottom of each hole; and, as soon as the water has been absorbed, the concrete shall be placed.

Forms shall be removed not sooner than 24 hours after placing of concrete. As soon as each form is removed, the footing shall immediately be backfilled with thoroughly moistened material in six inch (150 mm) loose layers and solidly tamped. The top shall be covered with not less than 4 inches (100 mm) of loose moistened earth. All excess excavation from footings and loose material used for curing shall be disposed of in a manner satisfactory to the Engineer.

**608.6-SPACING AND SETTING POSTS**

**608.6.1-General:** Posts shall be spaced in the line of fence as shown on the Plans with a tolerance of minus 2 feet (600 mm). Spacing of posts shall be as uniform as practicable under local conditions.

In general, in determining the post spacing, measurements shall be made parallel to the ground slope, and posts shall be placed in a vertical position

except in unusual locations where it would be more satisfactory to place the posts perpendicular to the ground slope and the Engineer so directs.

At all horizontal angle points, vertical angle points, and terminal points of the right-of-way fence, corner, pull, or end posts shall be placed, as the situation may demand, along with the necessary amount of bracing and number of approach posts as shown on the Plans. Steel line posts shall be spaced at a maximum of 10 ft. (3 m) center to center, and wooden line posts shall be spaced at a maximum of 15 ft. (4.5 m) center to center along the fence line. For chain link fence with steel posts and farm-field type fence with wooden posts, intermediate post assemblies shall be placed at 400 ft. (120 m) intervals (maximum) center to center from corner, gate, pull, or end posts, except where the distance is 500 ft. (150 m) or less between any combination of such posts. For farm-field type fence with steel posts, intermediate post assemblies shall be placed at 330 ft. (100 m) intervals (maximum) center to center from corner, gate, pull, or end posts, except where the distance is 400 ft. (120 m) or less between any combination of such posts. Gate posts shall be placed in the fence line where required and as directed by the Engineer. Details of all installations shall be as shown on the Plans.

Extra length posts shall be required at small ground depressions and also at steam crossings, less than 15 ft. (4.5 m) for wooden posts and less than 10 ft. (3 m) for steel posts, where it is not practicable for the fencing to closely follow the contour of the ground. Details of these installations shall be as shown on the Plans. The location of extra length shall be as dictated by the topography and as directed. Additional bracing shall be provided for extra length posts when shown on the Plans or directed. The Contractor shall close the space below the bottom of the fence fabric with barbed wire, stretched tautly between posts either on horizontal lines or fanned, as shown on the Plans or directed. At stream crossings greater than 15 ft. (4.5 ft.) for wooden posts and greater than 10 ft. (3 m) for steel posts, the fence shall be constructed as shown by special detail on the Plans or as directed. No special payment will be made for extra length posts, bracing, wire, fittings, etc., required at stream crossings or depressions.

Attention is directed to the fact that some posts may occur at or on existing roadway pavements, on old concrete foundations, or similar solid surfaces. There will be no additional compensation for breaking up such surfaces to set the posts. The Contractor may adjust the spacing to reduce the number of posts occurring on such surfaces subject to the maximum spacing specified, and there will be no additional compensation due to any increase in the number of posts when the Contractor elects to do so.

**608.6.2-Wooden Posts:** At the option of the Contractor, treated wood posts may be driven into place, provided the method of driving does not damage the post; or they may be installed in drilled or dug holes and backfill and compacted to the satisfaction of the Engineer. In any event, the posts shall be set solidly and any space left around the posts shall be backfilled and compacted as specified.

**608.6.3**

When posts are to be driven, the top of the posts shall be tapered to fit the driving head so that no gouging of the post will result. Any posts split or broken during driving operations shall be replaced at the Contractor's expense.

All wooden posts shall be placed with their large ends in the ground.

When setting posts in dug or drilled holes of dimensions larger than the post, the space around the posts shall be backfilled in layers of maximum six inch (150 mm) loose thickness, and each layer shall be thoroughly tamped. If the backfill material is too dry to compact to the satisfaction of the Engineer, it shall be dampened as it is placed.

**608.6.3-Steel Posts:** All steel end, corner, pull, gate, approach, intermediate assembly posts, and diagonal braces shall be set in concrete footings having the dimensions called for on the Plans. The dimensions of the footings may be varied as permitted by the Engineer but shall provide an equal volume of concrete. Except where rock is encountered, line posts shall be set or driven into the ground; and, in farm-field type fence, line posts shall be furnished with an approved plate or other satisfactory anchoring device to hold the post in proper alignment. The plate or anchor shall be satisfactory welded or riveted (not less than two rivets) to the post. Any post damaged by driving will be rejected.

**608.6.4-Posts Set in Rock:** If solid rock is encountered above the required elevation of the bottom of a post, a hole shall be drilled into the rock to the normal depth of the post or 18 inches (450 mm) into rock, whichever is less. In the latter case, the post shall be cut off at the bottom, if necessary, to provide the required post height above the ground surface. The diameter of post holes in rock shall be at least 3 inches (75 mm) greater than the largest dimension of the post.

For all posts, the portion of the post extending into rock shall be grouted in place. Grout shall consist of one part portland cement and three parts of sand, thoroughly mixed with a sufficient quantity of water to bring the mixture to a thick, but workable, consistency. For all wood posts and metal line posts, the excavation above the top of the rock shall be backfilled with material placed in six inch (150 mm) (maximum) loose layers and each layer thoroughly compacted. The anchor plate shall be removed when metal line posts (farm-field type) are to be set in rock. For all other metal posts, the concrete footings, as previously specified, shall be cast-in-place between the top of the rock and the ground surface.

**608.7-ERECTION OF FENCING MATERIALS:**

**608.7.1-General:** In cases where the controlled access line and the right-of-way line are not coincident, fence shall normally be erected along the controlled access line. When fencing follows either line, the fence shall normally be erected parallel to and 1 ft. (300 mm) inside the line. If this would result in undesirable appearances or unsatisfactory operational characteristics, the fence location shall be adjusted accordingly. In any case, the fence shall be

erected to the lines and grades shown on the Plans or established by the Engineer.

The Contractor shall clear the area, from the line of fence to a line approximately 4 feet (1200 mm) within the line of fence, of brush, undergrowth, etc., as directed by the Engineer. Such clearing shall be conducted in such a manner as to leave intact valuable trees and selected native growth. Only such trees as are directly on the line of the fence or that would otherwise, in the opinion of the Engineer, interfere with the construction of the fence, shall be removed by cutting then flush with the ground.

Materials removed in clearing shall be disposed of by the Contractor outside of the right-of-way and out of sight of any part of the highway in a manner approved by the Engineer, unless disposal within the right-of-way is specifically approved in writing by the Engineer.

The tension for stretching the fence shall be applied by use of mechanical fence stretchers and single wire stretchers designed and manufactured for that purpose and in accordance with the fence manufacturer's recommendations. The finished fence shall be true to line, taut, and solid at all points.

Posts shall be permanently positioned and concrete footings fully set before fabric is placed. Unless otherwise permitted, no fencing materials shall be installed on posts until seven days have elapsed from the time of placing of the concrete.

Barbed wire shall be placed at locations indicated on the Plans.

**608.7.2-Farm-Field Fence (Wood Posts):** Corner and pull posts shall be braced in two directions, and end and gate posts shall be braced in one direction. The braced post and the adjacent approach posts shall each be notched 1 in. (25 mm) deep at 8 inches (200 mm) from the top of the posts to the center of the notching to receive the horizontal brace. The horizontal wooden braces shall then be inserted into the notches anddowelled to the posts with ⅝ in. (16 mm) diameter galvanized steel pins 5 inches (125 mm) long.

Diagonal wire bracing shall consist of double strand # 9 gage wire, installed as shown on the Plans, which shall comply with the requirements for the fencing fabric. Two loops shall be made around each post at each point of attachment, the wires stapled to the posts, and the wires fastened back on themselves by means of at least three twists tightly wrapped. The strands of wire shall then be twisted together until the wooden brace is in compression. The compression shall not be great enough to cause lateral springing in the brace.

The placing and connecting of horizontal wooden braces and diagonal wire bracing for intermediate post assemblies shall be similar to that described above and shall be as shown on the Plans.

The bottom of the fabric of farm-field fence shall be placed a normal distance of 3 inches (75 mm) above the ground line; however, over irregular ground a minimum clearance of 2 inches (50 mm) and a maximum clearance of 6 inches (150 mm) will be permitted for a distance not to exceed 8 feet (2.4 m). Any necessary excavation and backfilling required in order to comply with

these provisions shall be made as specified.

At all line and approach posts the fencing material shall be securely fastened to the posts by means of 1-½ inches (40 mm) minimum # 9 wire galvanized staples. At end, pull, corner, intermediate assembly, and gate posts the lateral wires of the fencing material shall be wrapped tightly around the posts and the wire fastened back on themselves by means of at least three twists tightly wrapped. The fence fabric and barbed wire shall be attached to all posts at the vertical spacings shown on the Plans.

Fence fabric and barbed wire shall be fastened tightly to corner, pull, end, gate, and intermediate assembly posts for each straight run of fence, with each wire of the fabric being stapled to the posts before the fabric and barbed wire are fastened to the in-between line and approach posts. At the line and approach posts, the top and bottom wires and every other in-between wire of the fabric shall be stapled, alternating the stapling of the in-between wires on successive posts.

**608.7.3-Farm-Field Fence (Steel Posts):** Corner, pull, and intermediate assembly posts shall be braced in two directions, and end and gate posts shall be braced in one direction. These posts shall be braced by means of diagonal steel rods, connected to the posts and anchored in the ground in concrete footings, installed and having the dimensions as shown on the Plans.

The bottom of the fabric of farm-field fence shall be placed a normal distance of 3 inches (75 mm) above the ground line; however, over irregular ground a minimum clearance of 2 inches (50 mm) and a maximum clearance of 6 inches (150 mm) will be permitted for a distance not to exceed 8 feet (2.4 m). Any necessary excavation and backfilling required in order to comply with these provisions shall be made as specified.

At all end, corner, pull, gate, and intermediate assembly posts, the lateral wires of the ends of the fencing material shall be wrapped tightly around the posts and the wires tied back on themselves with not less than three twists tightly wrapped. The fencing material shall be fastened to line posts by approved ties or clips. The fence fabric and barbed wire shall be attached to all posts at the vertical spacing shown on the Plans.

Fence fabric and barbed wire shall be fastened tightly to corner, pull, end, gate, and intermediate assembly posts for each straight run of fence, with each lateral wire of the fabric attached, as specified above, before the fabric and barbed wire are fastened to the in-between line posts. At line posts,the top and bottom wires and every other in-between wire of the fabric shall be fastened by approved ties or clips to the posts, alternating the in-between wires to be fastened on successive posts.

**608.7.4-Chain Link Fence:** Corner, pull, and intermediate assembly posts shall be braced in two directions, and end and gate posts shall be braced in one direction. These posts shall be braced as detailed on the Plans. # 7 gage tension wires shall be attached to both the top and the bottom of the fence fabric for the entire length of the fence.

The bottom of the fence fabric shall be placed a normal distance of 1-2 inches (38 mm) above the ground line; however, over irregular ground a minimum clearance of 1 in. (25 mm) and a maximum clearance of 6 inches (150 mm) will be permitted for a distance not to exceed 8 feet (2.4 m). Any necessary excavation and backfilling required in order to comply with these provisions shall be made as specified.

Top and bottom tension wires shall be placed and fastened to all posts before the fence fabric is placed. Tension wires shall be tautly stretched during erection. The ends of the fabric shall be secured by the use of stretcher bars threaded through the loops of the fabric and secured to corner, pull, end, gate, and intermediate assembly posts by means of clamps with bolts and nuts. The number of clamps shall be as indicated on the Plans. The fabric shall be placed by securing one end of the fabric to the stretcher bar and applying sufficient tension to remove all slack before making the attachment at the other end of the fabric. Following these attachments, the fabric shall be fastened to line and approach posts and to top and bottom tension wires with tie wires or clips. A sufficient quantity of individual fabric ties or clips shall be furnished to provide for attaching the fabric to line posts at 12 inch (300 mm) vertical spaces.

**608.8-PAINTS AND PAINTING:**

Zinc-coated, triple-coated and aluminum-coated metal parts in the fence structure shall not be painted. After erection is completed, all fence construction will be inspected by the Engineer. All parts of the fence and gates (including bolts and nuts) from which the coating has been abraded so that the base metal is exposed shall be spot-painted with a zinc rich primer in the case of zinc-coated and triple-coated steel and with aluminum paint in the case of aluminum-coated steel.

Wood posts and braces shall be painted when called for on the Plans.

**608.9-ELECTRICAL GROUNDS:** All types of fences shall be grounded where a power line passes over the fence. The ground shall be installed immediately below the point of crossing. The ground shall be accomplished with a copper clad rod, 8 ft. (2.4 m) long and ⅝ in. (16 mm) (nominal) in diameter, driven vertically until the top is approximately 6 inches (150 mm) below the ground. A # 6 solid copper conductor shall be clamped to the rod and to the fence in such a manner that each element of the fence is grounded. Similar grounds shall be installed at a maximum of every 2,000 ft. (600 m) length of fence, whether or not there are power line crossings. For sections of fence less than 2,000 ft. (600 m) one ground shall be provided midway between the end posts.

**608.10-JUNCTIONS WITH EXISTING FENCES:**

Where the right-of-way fence intersects or joins existing fence, the Contractor shall make the junction between the fences in the manner specified. An end post corresponding in strength to the type used in the right-of-way fence shall be set on the line of the existing fence and approximately 4 inches

(100 mm) outside the centerline of the highway right-of-way fence. Existing fencing fabric, or similar, shall be stretched and tied to this end post in conformance with the construction requirements for the right-of-way fence. No direct connection shall be made between the existing fence and the highway right-of-way fence. All junctions shall be made in a workmanlike manner and will be subject to the approval of the Engineer.

**608.11-TEMPORARY FENCE:**

Temporary fence, when called for as a separate bid item, shall be erected at locations as shown on the Plans or as directed by the Engineer.

The Contractor shall set back and re-erect existing fences, erect temporary fences from salvaged fence material, or erect Electric fences at the direction of the Engineer.

**608.12-METHOD OF MEASUREMENT:**

Fence will be measured by the linear foot (m). Measurement will bealong the bottom wire of the fence from outside to outside of end posts for each continuous run of fence. The lengths occupied by gates will not be included in this measurement.

For farm-field fence with wood posts, the distance between posts for each intermediate assembly will be measured only once; the lap in the fencing fabric at intermediate assemblies will be included in the cost of the fence.

Temporary fence and gates, subject to the provisions specified, will be measured along the bottom of the fence from outside to outside of end posts for each continuous run of fence.

Gates, except when used when temporary fence, will be measured as complete units of the size and type specified.

**608.13-BASIS OF PAYMENT:**

The accepted quantities of fencing materials will be paid for at the contract unit price per linear foot (meter) for fence and per each for gates of the types and sizes specified, complete in place.

This price will include the cost of clearing, grubbing, excavating, trenching, concrete footings, backfilling, drilling in rock, grouting posts in place, painting, electrical grounds, connections to existing fences where required, furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the work.

When a separate bid item for temporary fence or gate is not provided for in the Contract, there will be no compensation for constructing such a fence or gates and the cost will be included in the unit price bid for permanent right-of-way fence.

**608.14-PAY ITEMS:**

| ITEM | DESCRIPTION | UNIT |
|---|---|---|
| 608001-* | "size" RIGHT-OF-WAY FENCE, CHAIN LINK | LINEAR FOOT (METER) |

| | | |
|---|---|---|
| 608002-* | "size" RIGHT-OF-WAY FENCE, FARM FIELD | LINEAR FOOT (METER) |
| 608003-* | "size" TEMPORARY FENCE | LINEAR FOOT (METER) |
| 608004-* | "size" PEDESTRIAN GATE, CHAIN LINK | EACH |
| 608005-* | VEHICULAR GATE, CHAIN LINK | EACH |
| 608006-* | PEDESTRIAN GATE, FARM FIELD, "size" | EACH |
| 608007-* | VEHICULAR GATE, FARM-FIELD, "size" | EACH |

*Sequence Number

# SECTION 609
# SIDEWALKS

**609.1-DESCRIPTION:**

This work shall consist of the construction of portland cement concrete sidewalks in accordance with these Specifications and in reasonably close conformity with the lines and grades shown on the Plans or established by the Engineer.

**609.2-MATERIALS:**

Materials shall meet the requirements specified in the following Subsections of Division 700:

| MATERIAL | SUBSECTION |
|---|---|
| Expansion Joint Filler (Preformed) | 708.1, 708.2 |
| Joint Sealing Material | 708.3 |

**Bed Course Material:** Bed course material shall consist of approved gravel, crushed stone, or crushed slag meeting the gradation requirements in 704.6.2 for Class 1 or Class 2, unless otherwise specified on the Plans.

Concrete shall be Class B conforming to the requirements of 601.

Concrete mixes will be subject to inspection and tests at the mixing plants for compliance with quality requirements.

All materials will be subject to inspection for acceptance as to condition at the latest practicable time the Engineer has the opportunity to check for compliance prior to or during incorporation of materials in the work.

## CONSTRUCTION METHODS

**609.3-SUBGRADE PREPARATION:**

The subgrade shall be constructed true to grade and cross section as shown on the Plans or directed by the Engineer. It shall be watered, if required, and thoroughly compacted before placing the concrete or bed course material. All soft and yielding material shall be removed and replaced with suitable material.